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HEALTH CARE 'ANYTIME, ANYWHERE'

2005 COMPUTERWORLD HONORS CASE STUDY

MEDICINE

AN IP COMMUNICATIONS INFRASTRUCTURE FOR VIDEOCONFERENCING, DATA, VOICE, AND WIRELESS SERVICES ENABLES A HEALTH PROVIDER COVERING A MASSIVE PATIENT BASE OF 70,000 PEOPLE TO DELIVER BETTER DIAGNOSTICS AND PATIENT TREATMENT AND ROLL OUT NEW SERVICES, WHILE CONTROLLING COSTS. **[20055430]**

SUMMARY

To serve a patient base of over 70,000 people spread over a huge geographic area in northern Alberta, the Northern Lights Health Region engaged IBM and Cisco to implement an IP Communications infrastructure for videoconferencing, data, voice, and wireless services. This new environment enables Northern Lights to deliver better diagnostics and patient treatment and roll out new services, while controlling costs.

APPLICATION

When a diphtheria epidemic broke out in Fort Vermillion, Alberta, during the midwinter of 1928-29 and dog sleds couldn't cover the 960-kilometer (600-mile) distance from the capital city of Edmonton in time to prevent a tragedy, bush pilots Wilfred May and Vic Horner risked frostbite and subzero conditions to ferry life-saving medicine by air – in an open-cockpit barnstorming plane without landing skis. In ensuing years, countless Canadian physicians, specialists, and nurses hopped aboard small aircraft to care for injured or critically ill patients in the sparsely populated far north.

Throughout its history, Canada has been distinguished by both innovation and tenacity in surmounting barriers of distance, geography, and climate to deliver essential services to its people. It is also often defined by a commitment to provide the best available medical care to all of its citizens. The Canada Health Act mandates that all Canadians have access to the health services they need, no matter where they live or move within the country's ten provinces and three territories; that those services are effective, patient-centric, safe, and of the highest quality; and that the country's healthcare system "remain both sustainable and affordable" today and into the future.

Alberta's Northern Lights Health Region (NLHR) is a prime example of both traditions. Responsible for more than a quarter of the province's territory – 184,454 square kilometers, or 71,218 square miles – Northern Lights is the largest in area of Alberta's nine provincially funded health regions. Although it is growing at an annual rate of four percent, the region's population of slightly more than 70,000 represents only 2.4 percent of Alberta's 2.98 million people.

The Northern Lights Health Region borders on the Northwest Territories, and is far from the population centers of Edmonton and Calgary; indeed, Fort Vermillion, site of the 1928 epidemic, is one of the cities it serves. The product of a 2003 amalgamation of two adjoining regional organizations (the Northwest Health Region and the former Northern Lights Regional Health Authority), it is an L-shaped district in which the southeasternmost city and administrative center of Fort McMurray is over 500 km (300 miles) "as the crow flies" from the northwesternmost facility, in Rainbow Lake. In reality, those two destinations seem even farther apart, because the major roads in the region run north/south and east/west, not diagonally. A typical car ride between the two cities can take many hours, even in good weather.

In this vast area, which contains an average of slightly less than one person per square mile, Northern Lights administers eight facilities and 16 total sites, and provides acute care, chronic care, services for the disabled, rehabilitation services, emergency medicine, home care, community medicine, long-term care, and a 24-hour hotline. It interfaces with provincial health authorities to offer mental health and cancer care services, and with peer regional authorities and other organizations across Canada and abroad.

Faced with the imperative of overcoming geography to provide optimum health care "anytime, anywhere," Northern Lights continued for much of the 20th century the necessary practice of flying

doctors and specialists to remote sites to care for geographically isolated patients and facilities. In some cases, patients were required to travel long distances by car or ambulance, often under poor conditions and in pain or discomfort, to visit a physician. The process was unsatisfactory on many levels: it resulted in a longer time-to-diagnosis and time-to-treatment, added stress to the seriously ill or injured, and was highly costly in terms of physician productivity lost and dollars spent.

Then advancing information technology began to make a difference. In 1999, Northern Lights introduced TeleHealth, a videoconference solution that connects patients and staff in remote facilities with physicians and specialists located elsewhere. TeleHealth was highly successful in improving communications across Northern Lights' facilities and providing greater access to diagnostic and treatment services to the people of the region. The NLHR, understanding that TeleHealth could also positively impact other aspects of health care delivery, began to plan for the rollout of additional videoconference-enabled service.

Before these new services could be introduced, however, the NLHR had to drive down the high expense associated with TeleHealth's technology infrastructure. Dedicated, leased TDM (time division multiplexing) telephone circuits were costing up to CDN $84,000 per year – and TeleHealth's next generation of videoconferencing services figured to push that cost up much higher. The authority also wanted to stem rising long distance telephony costs between its geographically dispersed facilities.

Ultimately, Northern Lights needed a technology foundation capable of accommodating the dynamic changes in the organization and the increasing demands on its voice and data services.

With its multiple facilities using disparate voice systems and a new hospital under construction in the community of High Level, the Northern Lights Health Region had a complex set of requirements. For example, the hospital at Fort McMurray had invested in a TDM-based Mitel SX-2000 PBX (private branch exchange) that had reached its capacity of 450 phones; it needed to supplement this PBX with a second call processing technology in either a TDM or a hybrid TDM/IP environment. After the 2003 merger, an expanded Northern Lights Health Region faced a critical need for integration of voice services, because different sites had disparate systems. Thus, system-wide functionality was limited and basic capabilities such as the forwarding of voice mails were not available. Northern Lights also was vitally interested in rolling out a suite of wireless solutions – such as handheld devices for a physician to use for clinical notes or access to key records at the patient's bedside – and wanted an open, flexible and cost-effective platform for these services.

Finally, Northern Lights needed to preserve other existing technology investments wherever possible. It was imperative that any new infrastructure be integrated into its MediTech Health Care Information System, which contained critical applications and data for the organization. It also needed to seamlessly connect with Alberta's other health authorities, which included more than 250 sites, to share knowledge resources across the province, Canada, and internationally.

Northern Lights selected IBM and Cisco Systems to design and deploy a converged network infrastructure that included IP communications, videoconferencing technologies, Cisco and IBM storage solutions, and IBM servers and systems integrated with MediTech HCIS. The new communications infrastructure enables Northern Lights to provide the highest level of medical services accessible to everyone and sustainable well into the future.

BENEFITS

The information technology solution, jointly designed and deployed by IBM and Cisco Systems, significantly improves patient access to critical healthcare services through the delivery of remote diagnostics and care capability. The advanced IP Communications platform positively impacts the utility and effectiveness of existing applications such as videoconferencing, and supports the rollout of new services, such as wireless. It also helps deliver these capabilities at a lower cost on an ongoing basis.

According to Colin Jardine, chief information officer, Northern Lights Health Region, "[This solution] puts tools in the hands of physicians where they need them, at the time they need them. That's what really matters to them, and to their patients. The IBM/Cisco solution here has given us new opportunities [to improve patient care], where we had none before."

IMPORTANCE

Delivering care to remotely located patients and facilities demands highly sophisticated technology. The

Northern Lights solution includes a totally upgraded infrastructure – a Cisco Intelligent Information Network, upgraded IBM x345 high availability servers, and a suite of Cisco IP Communications solutions, including Cisco IP Videoconferencing, Cisco Call Manager for call processing, Cisco Unity unified messaging, Cisco 7912, 7940 and 7960 IP phones, Cisco IP Contact Center Express Edition, and Cisco voice gateways for connectivity to TDM voice networks.

The IP telephony deployment began at Fort McMurray Hospital within a hybrid environment that will migrate to a total IP system by the end of 2005. A "green field" Cisco IP Communications infrastructure was installed in the new High Level site, including a Cisco CallManager server and 200 Cisco IP phones. Through the end of 2006, most remote clinics are scheduled to convert to IP Communications using Cisco Survivable Remote Site Telephony (SRST), which will extend high availability IP Communications services from CallManager servers located in Fort McMurray and High Level. The new infrastructure was successfully integrated with Northern Lights' existing MediTech Health Care Information System.

ORIGINALITY

While network convergence—combining voice, data, and video on a single network—is far from unique, the deployment of leading-edge technology in such a disparate, rural region is unusual. With population densities of just one person per square mile, videoconferencing is one of the last services anyone would expect to see reaching out to tiny villages hundreds of miles from population centers. The mandate to deliver better diagnostics and patient treatment made the implementation of this new technology possible.

SUCCESS

The new infrastructure supported Northern Lights as it transformed its processes to deliver better care to its patients. It made the TeleHealth initiative even more valuable as a way to provide faster, more accurate, diagnoses. "Our patients can walk in off the street, get an x-ray taken, bring up video conferencing, and actually have an interactive session with an orthopaedist," Mr. Jardine says. "It's very convenient for them and it's saving money, too. The new network has saved us [CDN] $75,000 annually in video conferencing costs alone."

Removing the cost barrier for videoconference and voice communications in general – and rolling out wireless services – has improved communications across the Northern Lights facilities, and enabled a suite of new TeleHealth programs, many of which are designed to help patients who are being treated outside hospital walls. These include:

- TeleHome, for home-based monitoring of patients' heart rate, blood pressure, blood glucose levels, and pulse;
- TeleVisitation, connecting families with patients in remote or isolated facilities;
- TeleOrthopaedics, connecting Northern Lights' facilities with specialists in Edmonton;
- TelePsychiatry, for the assessment and treatment of some psychiatric patients;
- Connections to specialists in disciplines such as heart and lung, geriatric care, and amputee services; and
- A "seating clinic" to enable wheelchair-bound patients to get expert consultation.

In short, the new communications infrastructure is enabling Northern Lights to fulfill its obligation to provide superior medical care that is accessible to all, and sustainable for future generations.

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DIFFICULTY

The Northern Lights Health Region faced three challenges. First, they had to provide a comprehensive suite of health care services to a population spread across a very large geographic area, making services accessible to facilities and homes on an "anytime, anywhere" basis. Second, they had to create a cost-effective communications infrastructure for videoconference, wireless, data, and voice communications services, integrated with the existing MediTech Health Care Information System. To provide investment protection and a next-generation services platform, this infrastructure had to both supplement existing time division multiplexing (TDM) voice systems in certain hospitals, and provide a "green field" IP Communications environment in other facilities across the region. Third, they needed to seamlessly connect the regional authority with peer organizations and other health care providers

across and beyond the province of Alberta.